HYPERPARATHYROIDISM

Dr. Touseef Anwar

Abstract: It is a medical disorder in which there is over activation of parathyroid grands leading to increased secretion of parathyroid hormone. Hyperparathyroidism is divided into primary, secondary and tertiary. Clinical features include anorexia, constipation, nausea, weakness, psychosis, dehydration, prurits, renal stones. Diagnosis of hyperparathyroidism is by measuring PTH level, serum fasting calcium, phosphate sample and radiological examination. The main aim of management is to identify and remove the possible precipitative factors and management of electrolyte imbalance. It includes parathyroidectomy, hydration, intravenous bisphosphanate, forced diuresis and dialysis in renal failure.

Key words: Parathyroid gland, Serum calcium, Vitamin D, Serum phosphate

DEFINITION:

Hyperparathyroidism is medical disorder in which there is over activation of parathyroid glands leading to increased secretion of parathyroid hormone (PTH).

CAUSES & PATHOPHYSIOLOGY:

On the basis of etiology hyperparathyroidism is divided into three types, primary, secondary and tertiary.

Hyperparathyroidism due to unknown cause is called primary hyperparathyroidism (PHPT).

Primary hyperparathyroidism caused by increased secretion of PTH usually by single parathyroid adenoma (80%), by parathyroid hyperplasia (15%) or rarely by carcinoma of parathyroid gland. As the cause of PHPT is unknown but chromosomal rearrangements in regulatory region of parathyroid hormone gene have been identified.

Secondary hyperparathyroidism (SHPT) is physiological compensatory hypertrophy of parathyroid glands lead to hypersecretion of PTH due to hypocalcaemia (as hypocalcaemia occurs in Vitamin D deficiency, hungry bone syndrome and chronic kidney disease). In SHPT the PTH level in blood serum is raised but calcium levels are low.

Tertiary hyperparathyroidism (THPT) is state in which there is severe hyperparathyroidism due to prolong secondary hyperparathyroidism, most commonly in patients of renal failure. It is parathyroid hyperplasia after longstanding secondary hyperparathyroidism. Plasma calcium and phosphate are both raised and parathyroidectomy is necessary at this level.

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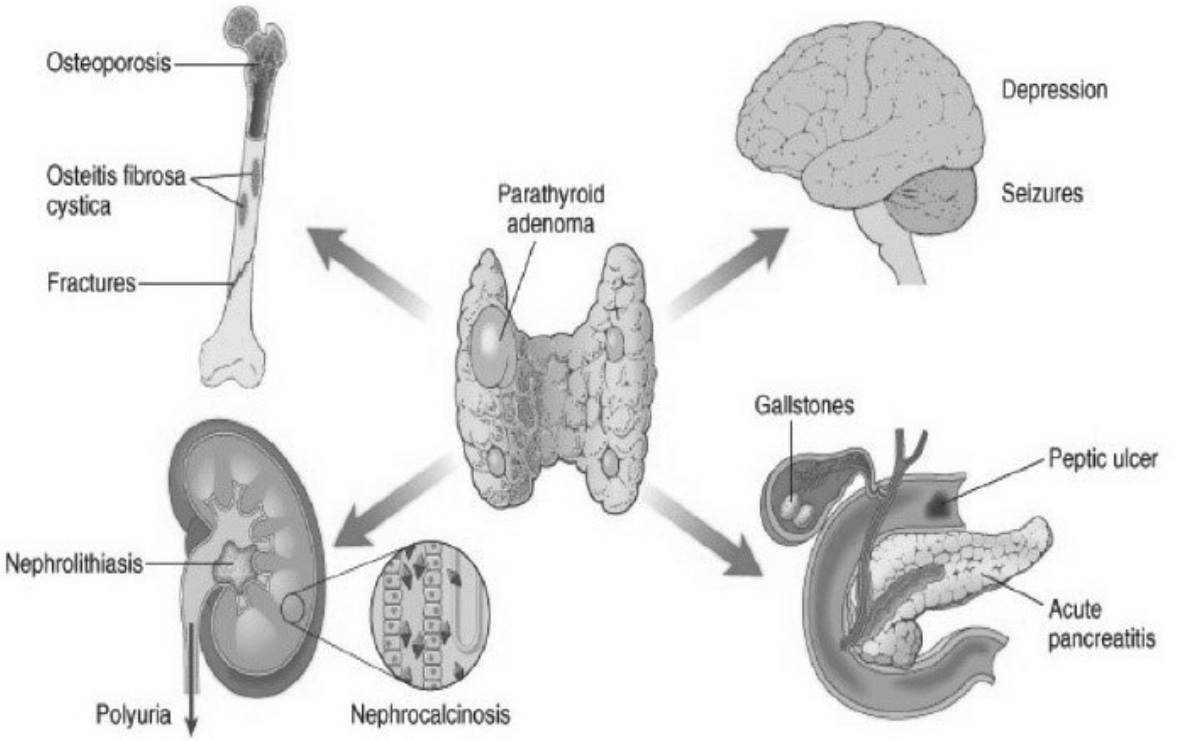

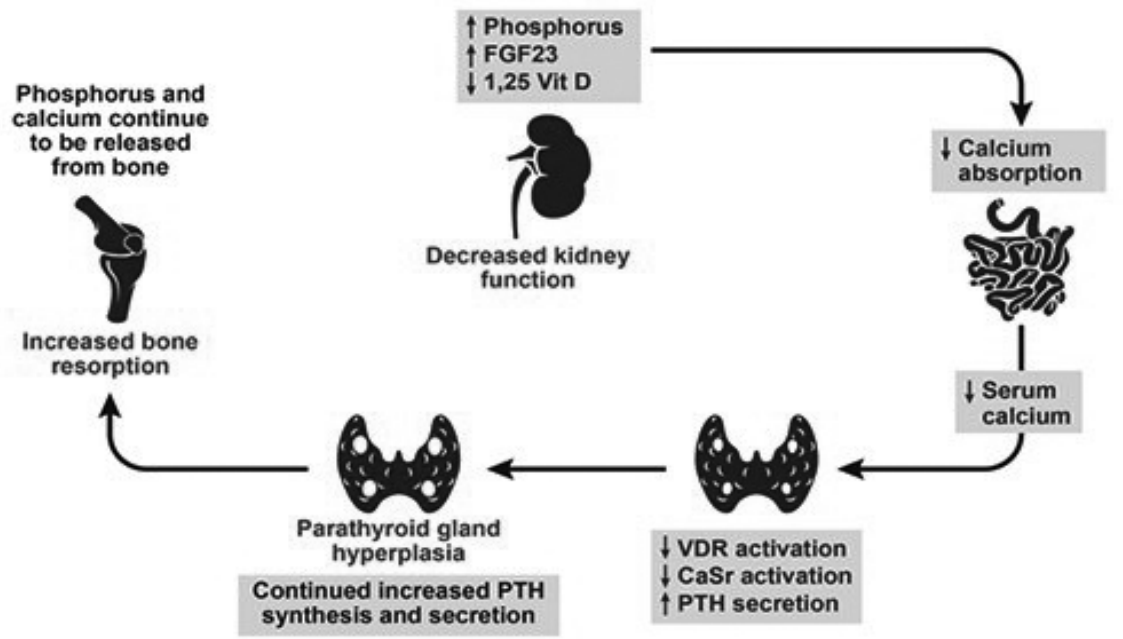

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Hyperparathyroidism		
Primary	**Secondary**	**Tertiary**
Causes		
Parathyroid adenoma (80%), Hyperplasia and carcinoma. MEN1 and MEN2. Hyperparathyroid jaw tumor syndrome. Familial isolated hyperparathyroidism.	Renal failure. Decreased calcium due to vit. D deficiency, malabsorption, osteomalacia, rickets and use of lasiks. Inhibition of bone resorption e-g Hungry bone syndrome.	Autonomous hypersecretion of PTH e-g After renal transplantation surgery
Serum Calcium Level		
Raised	Low	Raised
Parathyroid hormone		
Not suppressed	Raised	Not suppressed

CLINICAL FEATURES:

Primary hyperparathyroidism is most common among all three types of hyperparathyroidism and it presents as clinical manifestations of hypercalcemia. Patients with mild to moderate hypercalcemia (mild serum calcium level <mmol/L) usually asymptomatic. General clinical features of hypercalcemia include anorexia, constipation, nausea, weakness, psychosis, dehydration, pruritis and hypertension. With severe hypercalcemia (serum calcium level greater than 3 mmol/L) patient presents with renal manifestations which include, polyuria, polydypsia, nocturia and hypertension, and calcium deposited in the renal parenchyma lead to nephrocalcinosis or calcium oxalate stone formation (5% with PHPT). Renal colic occurs due to stones. Polyuria occurs due to effects of hypercalcemia on renal tubules, decreases their concentrating ability (form of nephrogenic diabetic inspidus). Skeletal manifestations include osteopenia, osteoporosis, bone pain and tenderness. Bone resorption mainly involved cortical instead of tubular bones. In long standing the osteitis fibrosa cystitica can develop, which presents as pathological fractures which is called brown tumors. Others less common bony manifestations include swelling of mandible due to cyst formation, chondrocalcinosis, degenerative arthritis, acute pseudogout and falling of teeth occurs.

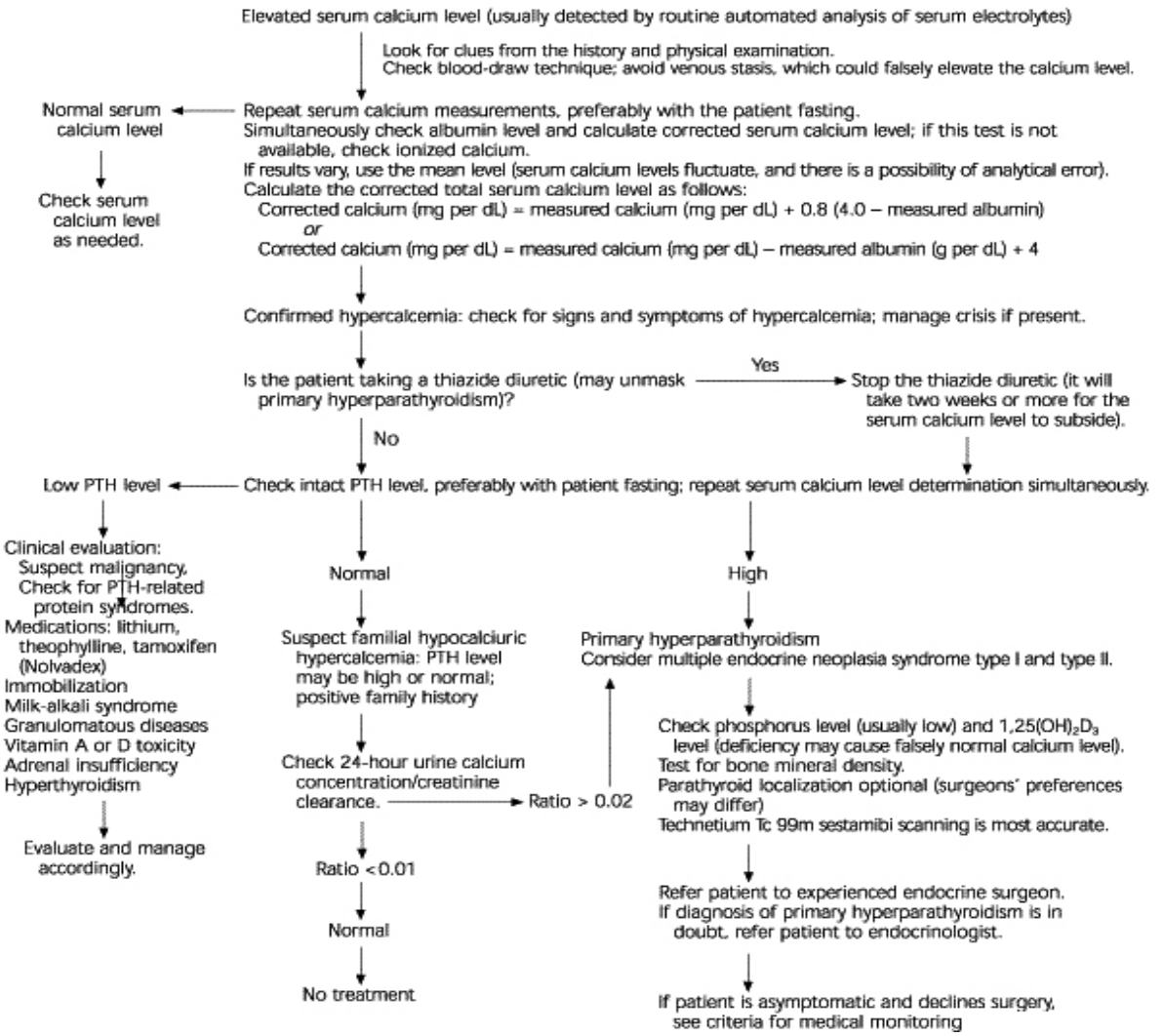
INVESTIGATIONS:

Diagnosis of primary hyperparathyroidism established after several samples of inappropriate high PTH level, fasting serum calcium, phosphate samples and radiology. The hallmark of primary hyperparathyroidism is hypercalcemia and hypophosphateamia with detectable or elevated intact PTH levels during hypercalcemia. To localize adenoma before surgery parathyroid 99mTc-sestamibi scintigraphy scan with single proton emission computed tomography (SPECT) / ultrasound / MRI examination is performed. Serum calcium, serum PTH and urine calcium excretion, serum alkaline phosphatase (in case bone disease) are raised in PHPT. Use of thiazide diuretics should be discontinued two weeks before a serum calcium level measurement is repeated. Skeletal X ray is normal in mild to moderate hyperparathyroidism, in these patients dual energy X ray absoptiometry bone density scanning is useful. In severe hyperparathyroidism, demineralization of bones with periosteal erosions and terminal resorption of the phalanges more on radial aspects of finger occur in earlier stages. A “pepper-pot”/ “salt-pepper” appearance on lateral x ray of skull is seen. Reduced bone mineral density lead to osteopenia and osteoporosis is most

common skeletal manifestation of HPT. Hypercaciuria is used to differentiate between primary hyperparathyroidism and familial hypocalciuric hypercalcemia (in FHH the serum PTH is normal range and urine calcium level is low). Differentiation between PHPT is very important because the latter it does not respond to parathyroid surgery. In case of malignancy the PT level is low in hypercalcemia. In patients with renal impairment the third generation PTH assays should be measured. In secondary hyperparathyroidism there is focal or generalized bony sclerosis, rugger-jersey appearance of spine on radiological investigation is found.

MANAGEMENT:

The main aim of management is to identify and remove the possible precipitants factors and manage electrolyte imbalance.



Courtesy: https://www.aafp.org/afp/2004/0115/p333.html

Treatment is based on type of the hyperparathyroidism, severity of hypercalcemia and nature of associated symptoms. In case of primary hyperparathyroidism the surgical parathyroidectomy (excision of solitary parathyroid adenoma or hyperplastic gland) is treatment of choice. Indications of surgery (in asymptomatic patients) include significant hypercalcemia after repeatedly correction medically, (in symptomatic patients) age less than 50 year, pregnancy, nephrolithiasis, creatinine clearance less than 60 mL/min, bone density (lumbar spine, hip, or forearm) that is > 2.5 standard deviations below peak bone mass (T score less than -2.5), serum calcium 1mg/dL above the upper limit of normal, urine calcium excretion greater than 400 mg/24 hrs and in case of identifiable complications (pseudogout, osteoporosis, peptic ulcer disease and renal impairment). Minimal invasive approach used by experienced surgeon, if preoperatively localized adenoma by sestamibi scans with single proton emission computed tomography (SPECT) / neck ultrasound/ MRI. Due to risk of transient hypocalcaemia as it develops after parathyroid surgery, postoperatively close monitoring is required of calcium and phosphorus. Other complications postoperatively involved bleeding and recurrent laryngeal nerve palsies that's why vocal cord function should be assessed before surgery.

Hypercalcemia is managed with large fluid intake (hydration with saline ≤6 L/ day), intravenous bisphosphonate (potent inhibitors of bone resorption), forced diuresis along with aggressive hydration and dialysis is used in renal failure.

For FHH, no therapy is recommended, secondary hyperparathyroidism is treated with restriction of phosphate, the use of nonabsorbale antacids/sevelamer and calcitriol. Tertiary hyperparathyroidism is treated as same like primary hyperparathyroidism (parathyroidectomy).

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